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ABSTRACT

Thirteen of the 41 classroom observation dimensions derived from Medley's review of teacher effectiveness reports were scored on the Georgia Assessment of Teacher Effectiveness. Subjects were 53 fifth and sixth grade teachers in language arts and mathematics. The dimensions were: large group instruction; group size without adult supervision; student seatwork, teacher structuring, student choice; structured academic time; student verbal interaction; correct substantive responses to teacher questions; low cognitive level questions; teacher discusses student response; teacher hostility and rebuking behavior; disruptive student behavior; student time on task; non-substantive teacher-student interaction; and structured student behavior. The contribution of each dimension to spring-term student achievement on the Iowa Tests of Basic Skills (ITBS) was calculated, after eliminating variance attributed to the fall-term pretest, grade level, and socioeconomic status. All dimensions were significantly related to at least one of five ITBS subtests: vocabulary, reading, spelling, mathematics concepts, or mathematics problems. (CP)

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EMPIRICALLY DERIVED DIMENSIONS OF CLASSROOM BEHAVIOR AS PREDICTORS OF STUDENT ACHIEVEMENT

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Introduction

A number of recent studies have examined relationships between observed classroom behaviors (process) and measures of student growth (product). The usual basis for obtaining the process measures is an apriori list of "competencies" derived from the literature and agreed-upon by a panel of judges. One such study was reported by the authors at the previous AERA meeting (Lorentz and Coker, 1979).

Medley's (1977) AACTE review provides an empirical basis for the development of a list of classroom behaviors which have been shown to relate to some measure of student growth. Teachers can be observed in regular classrooms by means of a low-inference observation system and their behaviors recorded in terms of these empirically-derived statements. The present paper reports a study in which these dimensions were recorded and related to measures of student achievement.

Method

Subjects

The subjects were 53 fifth and sixth grade classroom teachers and their students in a large metropolitan Georgia school district. During the observation periods 36 teachers taught Language Arts to 829 students and the remaining 17 teachers taught Mathematics to 360 students; these comprise the sample for the present study.

Measures

ITBS. The Vocabulary, Reading Comprehension, and Spelling subtests from Iowa Tests of Basic Skills, Form 5 and 6, Levels Edition, (Hieronymus and Lindquist, 1971) were given to all pupils in the Language Arts classes. The remaining students were given the Mathematics Concepts and Mathematics Problems subtests from the ITBS. The reported reliability and validity for the ITBS are adequate for use in the present study.

SES. An estimate of the sociometric status (SES) was obtained for each pupil based upon the occupation of the family's principal breadwinner using a modified version of Warner, Meeker and Eells (1960) classification of occupations and levels.

GATE. Georgia Assessment of Teacher Effectiveness (Coker, 1978) is a low-inference observation system designed to measure teacher behaviors, student behaviors and teacher-student interactions. GATE contains 341 sign items drawn from 5 well-established other observation systems. The items on GATE can be scored on a variety of keys to yield multiple stable measures of teachers' classroom behavior. The scoring of the GATE is independent of the data collection by observers.

Data Collection

The initial achievement tests were administered early in the Fall (1977) and posttests administered in late Spring (1978) in the same classrooms. A group of specially-trained testers administered the tests in each classroom.

During regular class sessions, trained observers visited each classroom on six different occasions and obtained two GATE records on each visit. Visits were scheduled in advance, but no attempt was made to preselect the activities to be observed, since the intent was to record a representative sample of the behavior present in each classroom. All observations were made by experienced classroom teachers who had been employed full-time as observers and been personally trained by the authors of GATE. Observer agreement studies confirmed that observers were consistently able to maintain agreement of 80 percent or better.

Analysis

ITBS. Subtest scores were converted from raw scores to Standard Scores using the published Standard Score Tables (Houghton Mifflin, 1973). These scores used a normalized standard score scale with a mean of 80 and a standard deviation of 20 for the entire grade range, 3-8 data in a single analysis.

Indicators of Teacher Effectiveness. Medley's (1977) review of the research literature on Teacher Effectiveness reports 41 common elements of classroom behavior and subsets of these elements as they were related to gains in reading and arithmetic and affect for students of different grade and SES levels. The CBTC project with the assistance of project consultants, including Dr. Medley, reduced these 41 elements to 15 indicators of teacher effectiveness.

Thirteen of the dimensions derived from Medley's study were scored on GATE. The investigators selected items which appeared

to reflect each of the dimensions being studied the 12 observation records for each teacher were then scored on the 15 dimensions, and the total scores standardized to T-scores across the 52 classrooms. Coefficient Alpha reliabilities were estimated using Hoyt's (1941) method. These dimensions are described below:

1. Large group instruction. (4 GATE items, Alpha = 0). This dimension is reflected when teacher works with half or more of the students in prescribed or non-prescribed settings.

2. Group size without adult supervision. (4 GATE items, Alpha = .51). This is seen in small groups (1 to 3) of students working on assigned tasks. Teachers give general directions to all groups or specific directions to individual groups.

3. Student seatwork, teacher structuring, student choice of what, how or when. (7 GATE items, Alpha = .29). This dimension is reflected when the teacher prevents perplexity, directs the students to do something preparatory to the learning task, or focuses by giving cues or hints while the students are in acceptable modes of behavior.

4. Structured academic time. (25 GATE items, Alpha = .78). This dimension is reflected in teacher presenting, asking questions, responding and using inductive, deductive or expository methodology while students are listening and complying.

5. Use of explicit cognitive teaching material. Not measured on GATE.

6. Student verbal interaction. (17 GATE items, Alpha = .73). This dimension is reflected when students feel free to volunteer on-task comments while teacher is in various modes of teaching including presenting, questioning and responding. In addition, the teacher encourages rather than discourages student expression.

7. Correct substantive responses to teacher questions. (9 GATE items, Alpha = 0). This dimension is reflected when teacher praises student for correct answer but does not tell student the answer is wrong. The teacher does not ask another student when one answers incorrectly, nor is the teacher critical or hostile to the student.

8. Low cognitive level questions. (4 GATE items, Alpha = .32). This dimension is reflected in teacher frequent use of recall questions at a simple cognitive level.

9. Teacher discusses student response. (8 GATE items, Alpha = .61). This dimension is reflected when teacher asks student or student volunteers to elaborate or evaluate his own idea or others' idea. Teacher also uses and extends student's answer or question.

10. Teacher works with individual student. Not measured on GATE.

11. Teacher hostility and rebuking behavior. (26 GATE items, Alpha = .68). This dimension is reflected in non-verbal (glares, frowns) and verbal (warns, scolds, humiliates, rejects, criticizes) negative affect with corresponding students on or off task response.

12. Disruptive student behavior. (12 GATE items, Alpha = .64). This dimension is reflected when students are involved in various modes of unaccentable behavior such as pouting, negative horseplay, teasing, resisting, disrupting, damaging property, off task comments, etc.

13. Student involvement (time on task). (34 GATE items, Alpha = .65). This dimension is reflected when student answers voluntarily or asks questions while teacher explains, questions students, praises students, or waits for cognitive response from student.

14. Non-substantive teacher-student interaction. (9 GATE items, Alpha = .51). This dimension is reflected when teacher digresses and students feel free to interact, (i.e., war stories).

15. Structured student behavior. (8 GATE items, Alpha = .42). This dimension is reflected in teacher suggesting, directing, or structuring problems while student listens, watches, and complies, answers questions directed to him or voluntarily, and asks questions for information and verification. Also, the teacher uses gentle methods of control.

Regressions. Using the General Linear Model (SAS, 1976) separately for reading and math groups, and for each of the five subtests, pretest, grade level, SES, pretest squared, and pretest times grade and the 13 GATE-scored Medley derived indicators were regressed on posttest.

At the level of the student, pretest and SES were used since these account for most of the variance in posttest. The grade level term was used since the standard scores for the ITBS were based on all grade levels 3-8. The product term, pretest x grade, was entered since the correlations of pretest and posttest tend to increase at higher grade levels, and this term permits fitting different regression slopes at different grade levels. The pretest squared term permits fitting a two degree curve to the relation between pretest and posttest, and tests if a non-linear fit is significantly better than a linear one. The contribution of pretest, grade level, SES, and the interaction terms, pretest squared and pretest times grade, are not considered in the discussion below since the variables of interest are the observed dimensions. The remaining terms in the model, the 13th GATE-scored indicators were entered as class-level means.

Results

One option which the SAS General Linear Model permits is to treat each variable as if it were the last to enter the regression model (Type IV sums of squares).

The contribution of each of the 13 behavioral dimensions to the five achievement areas after the elimination of variance due to pretest, grade level, SES, the non-linear and interaction term and the other 12 dimensions is discussed below. Table 1 presents

INSERT TABLE 1 HERE

the direction of the relationship (i.e., the positive or negative sign from the regression weight), the F-value calculated from the Type IV SS and the associated significance level.

Discussion

The largest number of significant relationships are seen between the behavioral dimensions and achievement in Vocabulary (8 significant F-values) and Reading (7 significant). There were three significant predictors of Spelling and Math Concepts, while there were no significant predictors of Math Problems.

The first dimension, Large Group Instruction, had a significant positive relationship with Reading. The second dimension, Small Groups, was significantly positively related to achievement in all areas except Math Problems. The positive direction of the relationship, however, was unexpected.

Dimension three, Student Seatwork and Teacher Structuring was significantly positively (as expected) related to the three Language Arts achievement areas. Structured Academic Time, and Student Verbal Interaction, the fourth and sixth dimensions measured, were significantly related to achievement in Vocabulary and Reading. The negative weight of the fourth dimension, however, was contrary to expectation.

Correct Response, dimension seven, was significantly related to Math Concepts. The negative weight again was not anticipated. Both dimension 8, Low Cognitive Level Questions and dimension 9 were significantly related to Reading, but in a positive rather than the negative direction expected. Teacher hostility, dimension 11, was, as expected, significantly negatively related to achievement in Vocabulary, Reading, and Math Concepts.

Dimension 12, Disruptive Student Behavior and dimension 13, Student Involvement, were both unrelated to achievement. Dimension 14 was significantly positively related to Vocabulary achievement, although the sign was expected to be negative.

Finally, dimension 15, Teacher Structuring, was, as expected, significantly negatively related to achievement in Reading and Spelling.

Conclusion

All of the empirically-derived behavioral dimensions, with two exceptions accounted for significant portions of the remaining variance in student achievement. And 11 of the 65 (13 x 5) relations examined were significant. This is a substantial improvement over the usual finding when apriori behaviors are used as predictors of achievement. We recommend that the continued development of lists of teacher behaviors be tied directly to empirical data as a starting point.

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TABLE 1

PREDICTORS OF STUDENT GROWTH

DIMENSIONS	LANGUAGE ARTS STUDENTS									MATH STUDENTS					
	VOCABULARY N = 818			READING N = 820			SPELLING N = 819			MATH CONCEPTS N = 357			MATH PROBLEMS N = 326		
	Sign	F	P	Sign	F	P	Sign	F	P	Sign	F	P	Sign	F	P
1. Large group instruction	+	0.18	NS	+	8.38	.01	+	1.13	NS	-	0.25	NS	+	0.07	NS
2. Small groups without adult supervision	+	17.13	.0001	+	10.87	.001	+	8.03	.01	+	6.40	.05	+	0.51	NS
3. Student seatwork, teacher structuring student choice.	-	21.87	.0001	-	4.05	.05	-	4.55	.03	-	1.80	NS	-	0.39	NS
4. Structured academic time.	-	11.44	.001	-	12.68	.001	+	0.13	NS	+	2.25	NS	+	0.02	NS
6. Student verbal interaction.	+	19.72	.0001	+	22.06	.0001	+	2.40	NS	+	0.02	NS	-	0.03	NS
7. Correct responses to teacher questions.	-	0.56	NS	-	0.28	NS	+	0.92	NS	-	4.77	.05	-	0.01	NS
8. Low cognitive level questions.	-	14.53	.0001	-	2.34	NS	-	0.53	NS	+	0.01	NS	-	0.78	NS
9. Teacher discuss student responses.	-	5.17	.05	-	0.09	NS	+	0.27	NS	-	6.62	.01	-	0.07	NS
11. Teacher hostility and rebuking behavior	-	20.98	.0001	-	7.76	.01	-	1.05	NS	-	6.51	.05	-	0.09	NS
12. Disruptive student behavior.	+	0.04	NS	-	1.71	NS	+	0.00	NS	-	2.63	NS	-	2.05	NS
13. Student involvement (time on task.	-	0.08	NS	+	0.09	NS	-	1.28	NS	-	9.08	.01	-	0.15	NS
14. Non-substantive teacher-student interaction.	+	4.93	.05	-	0.62	NS	-	1.77	NS	+	0.29	NS	+	0.04	NS
15. Teacher structuring-student freedom balance.	-	2.04	NS	-	18.07	.0001	-	8.65	.01	+	2.47	NS	+	0.18	NS